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2nd Quarterly Report

Geological and Hydrogeological Investigation in West Malaysia

Investigation No. 29830

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Geological Survey of Malaysia

December, 1976

Imagery Received

As from the end of November, 1976 the LANDSAT Follow-on Program of the Geological Survey of Malaysia had terminated with the EROS Data Center deleting the relevant standing request for data acquisition. To date the data products received are essentially the same as those listed in the 1st Quarterly Report.

It is now quite obvious that only three (3) imagery covering the east coast of Peninsular Malaysia fit into part of our requirements for the LANDSAT Follow-on Program. These three imagery cover the states of Trengganu and Pahang with Photo ID Nos. 824300236050000, 82448023535000 and 824480235550000 taken on 14th April, 1976.

Scene Description

The three scenes cover an area stretching from the northeastern tip of the Trengganu State coastline southwards through the central and southern Trengganu State and into southeastern Pahang State. The northern portion is completely cloud free but cloud cover increases rather rapidly southwards which obliterates most of the ground details.

The area covers almost the entire eastern granite belt (Eastern Belt) of Peninsular Malaysia of Upper Permian and Upper Triassic age. The granite intrudes sedimentary units of mainly argillaceous and arenaceous rocks of Carboniferous age. There are also indications of younger units of arenaceous and rudaceous rocks which exist as narrow, tightly folded belts.

Towards the western edge of the imagery is a broad zone of sediments which are characterized by its well developed folds trending north-northwest. They comprise thick sequences of argillaceous, arenaceous and rudaceous rocks of probably continental

origin, ranging in age from Jurassic to Cretaceous. These broadly folded Mesozoic rocks form the eastern edge of the Central Belt of Peninsular Malaysia which is mainly of Permian to Upper Mesozoic age. The boundary between the Central and Eastern Belt appears to be partly faulted or tectonic in origin and it trends north-northwest.

The dominant northerly to north-northwesterly tectonic trend of the area is evident by the orientation of the igneous bodies and sedimentary units. This trend appears to have persisted from Carboniferous to Mesozoic.

Evaluation

Considering the upper half of the interpretation map, it can be noted that the general outlines of the major igneous bodies were delineated. Apart from minor details and indeterminable features, these outlines tie up fairly well with the latest geological map.

The Younger Sediments which is probably Mesozoic in age is physiographically distinct as they invariably stand out as narrow, elongated (> 10 miles) ridges. The contrast is further enhanced by their location in coastal flats and within the Older Sediments which normally form low rolling hills. Lithologically the Younger Sediments are distinct in that they are essentially arenaceous to rudaceous with red sandstones and conglomerates.

To the west the Younger Sediments, which are dated as Upper Mesozoic in age, are broadly folded with prominent fold axes of up to 17 miles in length. They represent the eastern edge of the Central Belt of Peninsular Malaysia. Red shales, sandstones and conglomerates are also present. A mildly folded to flay-lying equivalent of the same sequence occur on the Gagau plateau near the headwater of the Trengganu River. Similar rock units are found scattered along the eastern boundary of the Central Belt south to the

state of Pahang. However, most of these units are not evident ir the imagery. The boundary between the Central Belt and the Eastern Belt is partly intrusive (with granite) and faulted (with the Older Sediments). A program for a uranium survey and phosphate exploration is beirg considered for the Younger Sediments in the Central Belt.

The Older Sediments are of Lower Carboniferous to Permian age. They consist mainly of shale and sandstone with subordinate tuff and phyllite. Folding is tight and complex, except for a long narrow belt of folded Permian rocks at the upper reaches of the Trengganu River where a regional fold axis appears to be evident. These sediments are intruded by the igneous bodies (mainly granite) giving rise to extensive mineralisation along a broad zone stretching south from Bukit Besi, on the upper reaches of the Dungun River, to the Bandi area, at the headwater of the Chukai River. It is interesting to note that this region has the highest density of fractures and circular structures which might represent minor intrusive bodies related to the mineralisation. Iron and tin were mined at Bukit Besi while tin, iron, wolframite and silver occur in Bandi. Most of the intrusive bodies, related to the circular structures, are probably different phases of granitic intrusion. Only two of these structures have been identified as non granitic in composition. They are the diorite bodies at Kelip Hill near the headwater of Dungun River and at Mount Besar, 15 miles to the southwest. Both bodies intrude only the Older Sediments.

To the south, about 10 miles north of the headwater of the Kuantan River, is a circular structure which appear to have the features of an impact structure. There is no accurate ground information available. The structure is about circular in outline and 2 miles across. The eastern half of the rim consists of a steep, narrow ridge rising to 2,000 feet in elevation. The ridge is

probably underlain by sedimentaries. The western rim is less well defined and is underlain by granitic rocks. Plans are being made to conduct fieldwork in the area.

The fracture systems trend northwest and northeast to east-northeast. This is quite in keeping with the known trend of the major fracture systems of Peninsular Malaysia. However, the imagery show a higher density of northeast to east-northeast fractures than identified by past mapping. The northeast fracture system is an important feature of the geology of the Trengganu State as it is invariably intruded by a system of dykes (ranging from a few inches to 50 feet) with varying composition of diorite, dolerite and lamprophyre. The fractures also indicate some of the granite/ sedimentary contacts are faulted.

The imagery covering the area south of the Pahang River (southeast Pahang State) has a high percentage cloud cover and poor resolution. Only a very general outline of the granite pluton and the major fault traces could be delineated. The only features of interest are the intrusive structures (circular) of dolerite bodies which are associated with iron mineralization around Bukit Ibam, 15 miles south of the Pahang River. Bukit Ibam was the largest iron ore mine in Peninsular Malaysia.

As shown in the interpretation map the coastal swamps and Quaternary deposits were delimited for the entire east coast. Strips of raised beaches containing sand ridges and intervening swamps can also be demarcated. Field investigations are being undertaken to assess the potential of silica sand in the raised beaches along the Trengganu State coast. Investigations into the groundwater potential of the Quaternary sediments around Kuala Trengganu and Tajong Gelang, 12 miles north of Kuantan are being undertaken.

Detailed aerial photo interpretation of the coastal strip, for detailing the exact location of the raised beach sand and swamp, is currently being undertaken.

Conclusion

It was realized in the course of interpretation that the broad synoptic view of the images allowed easy identification of circular features and major fault traces in low-lying areas. Sedimentary units were delineated in accordance with the prevailing rock-types present and where applicable the folding characteristics. Igneous units can easily be differentiated by tone, degree of fracturing, texture and drainage pattern. The large fold structures, anticlinoriums and synclinoriums, of the Younger Sediments on the eastern edge of the Central Belt can also be easily delineated because of the synoptic view which also allows easy definition of interrelations among fold or fault structures.

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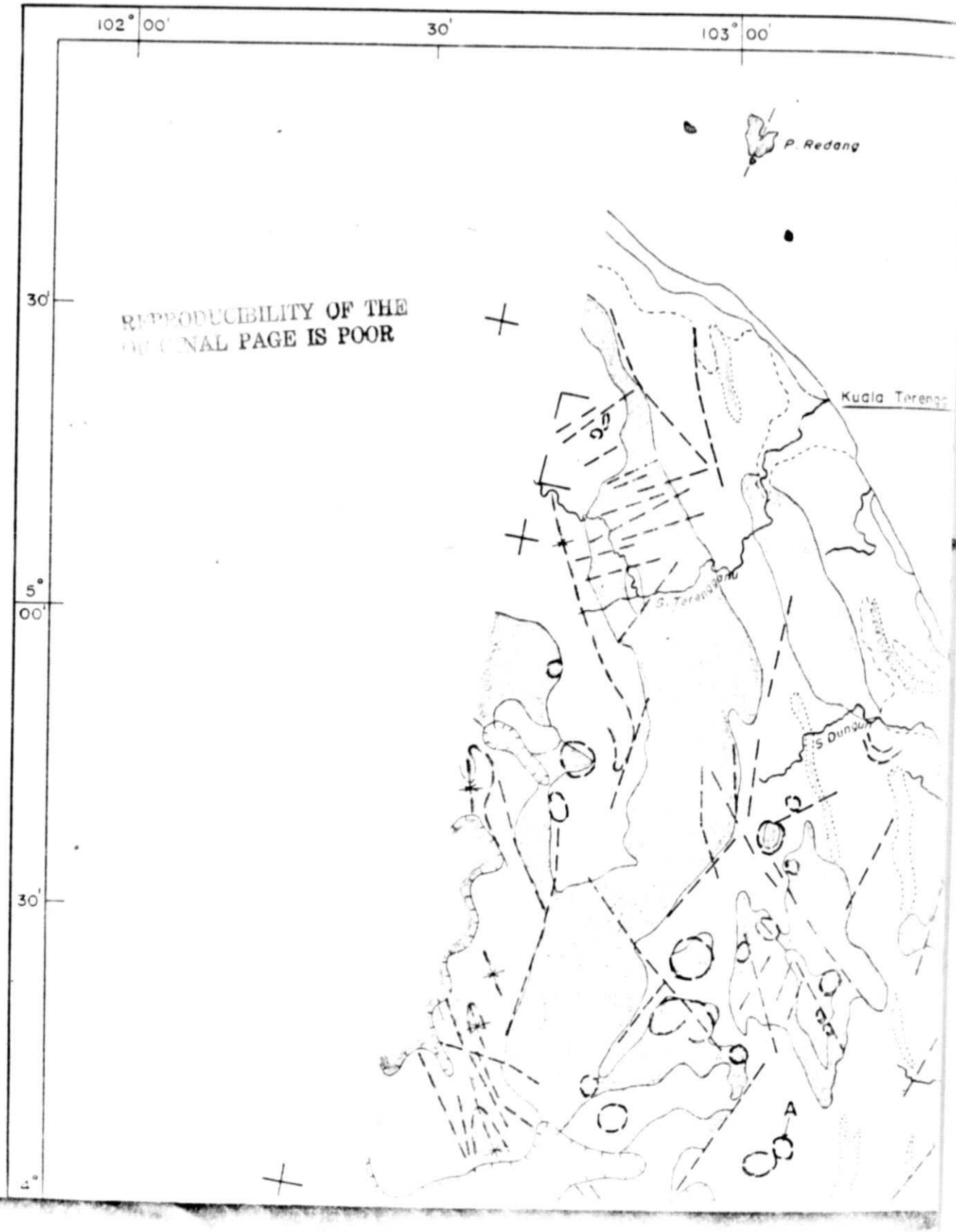

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5B

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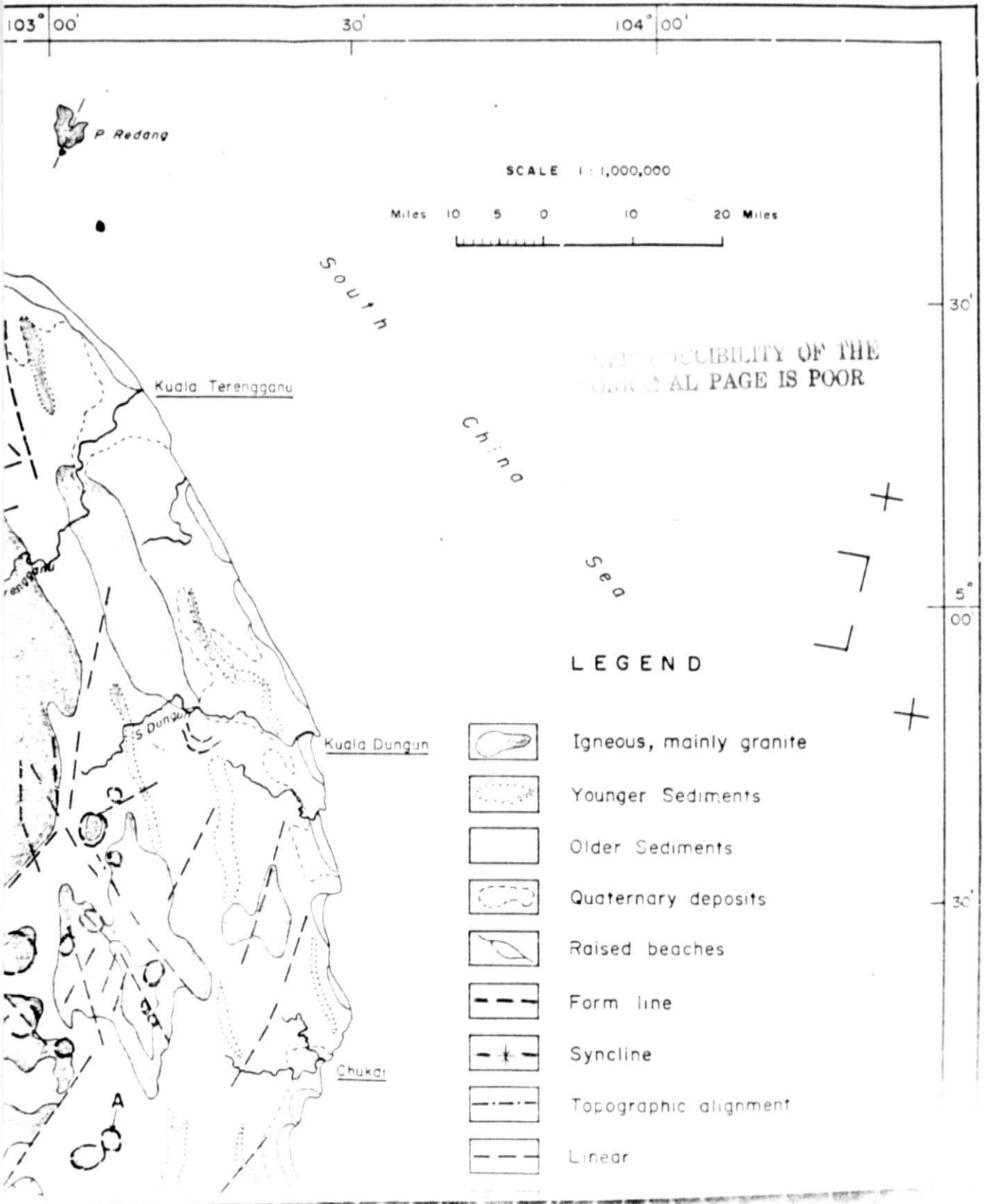
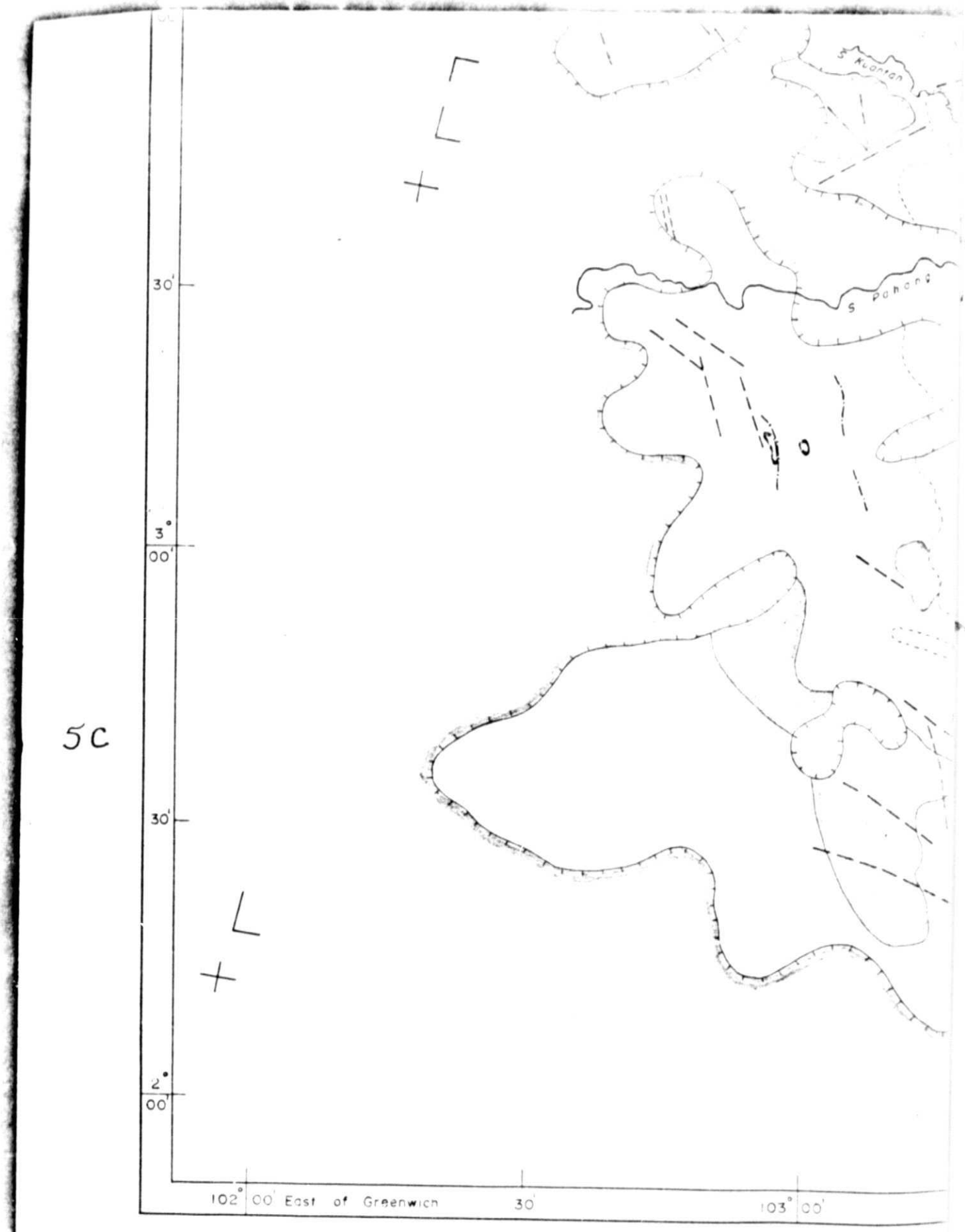
NSULAR MALAYSIA




S. Kuantan
S. Pahang
3°
00'
30'
2°
00'
102° 00' East of Greenwich
30'
103° 00'

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